

What is Claimed:

1 1. A process for fabricating an oxide, the process comprising:  
 2 (a) forming a first oxide portion over a substrate at a temperature below a  
 3 threshold temperature; and  
 4 (b) forming a second oxide portion under said first oxide portion at a  
 5 temperature above said threshold temperature.

1 2. A process as recited in claim 1, wherein the process further comprises:  
 2 (c) cooling said substrate at a controlled rate so that said first oxide portion  
 3 acts as a stress sink for said second oxide portion.

1 3. A process as recited in claim 1, wherein step (a) further comprises:  
 2 increasing an ambient temperature from an initial temperature to a first  
 3 temperature at a first rate; and  
 4 increasing said ambient temperature from said first temperature to said  
 5 temperature below said threshold temperature at a second rate.

1 4. A process as recited in claim 1, wherein said substrate is oxidizable  
 2 silicon and said threshold temperature is the viscoelastic temperature of silicon dioxide.

1 5. A process as recited in claim 3, wherein said first temperature is  
 2 approximately in the range of 750°C to 850°C and said first rate is approximately in the  
 3 range of 50°C to 125°C per minute.

1 6. A process as recited in claim 3, wherein said temperature below said  
 2 threshold temperature is approximately in the range of 800°C to 900°C and said second  
 3 rate is approximately in the range of 10°C to 25°C.

1 7. A process as recited in claim 1, wherein step (b) further comprises:  
 2 increasing an ambient temperature from a first temperature to a second  
 3 temperature at a first rate; and  
 4 increasing said ambient temperature from said second temperature to said  
 5 temperature above said threshold temperature at a second rate.

1 8. A process as recited in claim 7, wherein said temperature above said  
2 threshold temperature is in the range of approximately 925°C to 1100°C.

1 9. A process as recited in claim 7, wherein said first rate is approximately  
2 in the range of 5°C to 15°C per minute and said second temperature is approximately in  
3 the range of 875°C to 1050°C.

1 10. A process as recited in claim 7, wherein said second rate is  
2 approximately in the range of 5-10°C per minute and said temperature above said  
3 threshold temperature is approximately in the range of 925°C to 1100°C.

1 11. A process as recited in claim 7, wherein said temperature above said  
2 threshold temperature is maintained for a period of time and in an oxidizing ambient.

1 12. A process as recited in claim 11, wherein said oxidizing ambient  
2 includes an oxygen concentration of 0 to 25%.

1 13. A process as recited in claim 2, wherein said cooling further  
2 comprises:

3 reducing an ambient temperature from said temperature above said  
4 threshold temperature to an intermediate temperature at a first rate; and

5 reducing said ambient temperature to a final temperature at a second rate.

1 14. A process as recited in claim 13, wherein said first rate is  
2 approximately in the range of 2°C to 5°C and said intermediate temperature is  
3 approximately in the range of 800°C to 900°C.

1 15. A process as recited in claim 1, wherein said substrate is chosen from  
2 the group consisting essentially of monocrystalline silicon, polycrystalline silicon and  
3 silicon islands in a silicon on insulation (SOI) substrate.

1 16. A process for fabricating an oxide, the process comprising:

2 (a) exposing a substrate to a first oxidizing ambient at a temperature below  
3 a threshold temperature;

4 (b) exposing said substrate to a second oxidizing ambient at a temperature  
5 above said threshold temperature; and

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6 (c) cooling said substrate to a temperature below said threshold  
7 temperature.

*a*

1 17. A process as recited in claim 16, wherein step (a) further comprises:  
2 increasing an ambient temperature from an initial temperature to a first  
3 temperature at a first rate;  
4 increasing said ambient temperature from said first temperature to said  
5 temperature below said threshold temperature at a second rate; and  
6 growing at least a portion of the oxide.

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1 18. A process as recited in claim 17, wherein said first temperature is in  
2 the range of 750°C to 850°C and said first rate is approximately 50°C-125°C per minute.

1 19. A process as recited in claim 17, wherein said temperature below said  
2 threshold temperature is approximately 800°C-900°C and said second rate is  
3 approximately 10°C-25°C per minute.

1 ~~20.~~ A process as recited in claim ~~16~~, wherein said substrate is oxidizable  
2 silicon and said threshold temperature is the viscoelastic temperature of silicon dioxide.

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1 21. A process as recited in claim 16, wherein step (b) further comprises:  
2 increasing an ambient temperature from a first temperature to a second  
3 temperature at a rate of approximately 5-15°C/minute in an ambient oxygen concentration  
4 of approximately 0%-5%;  
5 increasing said ambient temperature from said second temperature to said  
6 temperature above said threshold temperature at a rate of 5-10°C/min in an ambient  
7 oxygen concentration of approximately 0%-5%; and  
8 growing at least a portion of the oxide in an ambient oxygen concentration  
9 of about 0-25%.

1 22. A process as recited in claim 16, wherein step (c) further comprises:  
2 reducing an ambient temperature from said temperature above said  
3 threshold temperature to approximately 800°C-900°C at a rate of about 2°C-5°C; and  
4 reducing said ambient temperature to a boat pull temperature at a rate of  
5 about 35°C-65°C per minute, wherein a first oxide portion formed in step (a) acts as a

1 ~~22~~. A process as recited in claim ~~16~~, wherein said substrate is oxidizable.

1 25. A process as recited in claim 22, wherein said first oxide portion has a  
2 thickness in the range of 7.5 to 20 Å.

1                    26. A process as recited in claim 22, wherein said second oxide portion  
2    has a thickness in the range of 2 to 12 Å.

1 27. A process as recited in claim 16, wherein the oxide has a thickness of  
2 15 Å or less.

1 28. A process as recited in claim 16, further comprising:  
2 (d) forming a high-k dielectric layer over the oxide.

1 29. A process as recited in claim 16, further comprising introducing  
2 nitrogen in step (a) so that a first oxide portion formed in step (a) is nitrated silicon  
3 dioxide.

1                    ~~30.~~ A process as recited in claim ~~16~~, wherein said threshold temperature is  
2    the viscoelastic temperature of SiO<sub>2</sub>.

1 ~~31. A process as recited in claim 22, wherein said threshold temperature is~~  
2 ~~the viscoelastic temperature of SiO<sub>2</sub>.~~